Item ID: . D412-664-209 Accept \*N900040100\* Setup Start **Revision ID:** Item Name: Crosstube Low Standard Aft **Start Date:** 27/08/2012 Start Qty: 1.00 **Cust Item ID: Customer:** Reference: Start Run Process Plan: MLJ Approvals: Date: 12/08/27 Tooling: Date: Stop Date: SPC (Y/N): Date: Sequence ID/ Operation Tool# Set Up/ **Tool ID** Plan Reject Accept Reject Insp. Work Center ID **Description** Qty Qty **Run Hours** Code Number Stamp **Draw Nbr Revision Nbr** D412-664-249 Rev B/DEO 100 DOCUMENT CONTROL \*100\* 0.00 Memo Photocopy bluefile and create labels as per PPP D412-664-209 CHG03 Document Control 110 0.00 Packaging Packaging 0.00 Memo Packaging 120 0.00 **BENDING MACHINE - CROSSTUBES** 12-11-7 \*120\* CNC Bend 2 0.00 CNC Alpha 160 Bender Bend tube as per Dwg D412-664-249 using CNC bender program FT

											DQA:	Date:	
NCR:	Yes	/ No				WORK ORDER NON-O	COI	NFORN	MANCE / UP	DATE			· L
											QA Closed:	Date:	
Work Ord	er.					DISPOSITION				AGAINST DE	PARTMENT	/PROCESS	
	_					Rework	7		Skid-tube	Crosstube	]	Water Jet	Engineering
Part I	Vo.					Scrap	1		Machining	Small Fab	Pro	d. Eng. Coor.	Quality
						· · · · · · · · · · · · · · · · · · ·			Thermoforming Finishing			re/Packaging	Other
NCR I	No					Work Order Update Large Fab Composite			Composite	_	Supplier		
Root					Descri	otion of work order update		Initial	Ac	tion	Sign &	,	
Cause		Date	Step	Qty		or Non-conformance	Ch	nief Eng	Desc	ription	Date	Verification	QC Inspector
Doc/Data													
Equip/Tooling	Ш												
Operator	Ш												
Material	Ш												
Setup	Ц												
Other	Ш					£***.							
Process	Ш					<b>√</b> 2					,		
Supplier	Ш										İ		
Training													
Unapproved													
						F	AUL	T CATE	GORY				
Landi	ng G	ear			_	General		_			_	-	_
		Bending				Bend	L	Grain		<u> </u>	Ovalized	<u></u>	Pressure/Forced
	Ш	Centre No	t Concer	ntric to C	)/S	BOM/Route		Hardwa	re		Over/Under	tolerance	Temperature/Cure
	Щ	Cracks				Broken/Damaged		Inspecti	on Incomplete		Part Incorre	ct	Weld
	_	Crushed/	Crimped.			Burrs		- 4	ons Incomplete/	Unclear	Part Lost/M	issing	Wrong Stock Pulled
		Cuffs				Contamination	L	Mainte	nance		Part Moved		
	╚	Heat Trea	t			Countersink		Mislabe	led		Positioned \	<b>N</b> rong	
	Цľ	nspectio	n Strip in	Tube		Cut Too Short		Misread			Power Loss/	/Surge	Other
	l le	Rinnles in	Rend			Drill Holes		Offset				<i>*</i>	

Out of Calibration

Out of Sequence

Outside Dimensions

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Turning Sequence

Wave/Twist in Tube

Torque Waves in Extrusion

Drawing

Finish Folio August-27-12 10:12:32 AM

Item ID: Revision ID:	D412-664-2	09		Accept	*Nc	റവ	<b>040</b>	100	)* s	etup Stai	1.77	S1*
Item Name:	Crosstube Lo	w Standard Aft								Sto	P *N	S2*
Start Date: Required Date: Reference:	27/08/2012 10/09/2012	Start Qty: 1.00 Req'd Qty: 1.00	*1* *1*			t Item II tomer:	D:					
Approvals:	Process Pla	ın:		Tooling:		Da	te:		R	tun Sta	<sup>rt</sup> *N	R1*
			•				te:			Sto	*N	R2*
Sequence ID/ Work Center I	D ,	Operation Description		Set Up/ Run Hours	То	ol ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
*130 *130*		QC6- Inspect dimension	s to drawing	0.00	12 83	12/n]	7					
QC Quality Control		Memo		0.00	<b>€-69</b> /		•		· — ·			
	A s	SEE STEP	135, PTO									
140	•		,	0.00								
*140*		Crosstubes										
Crosstubes		Memo		0.00								
Crosstubes			* ENSURE PROPER JIG	POSITIONING ********	***		Km				12-	11-7

1-Drill Rivet holes as per Dwg D412-664-249 . 2-Drill pilot holes in tube as per Dwg D412-664-249

3-Ream hole to finish size in tube as per Dwg D412-664-249
4-\*\*\* WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE\*\*\*

Deburr & Inspect for surface damage. Repair damage within limits as per Dwg

D412-664-249

12-11-7

s / N	n
	s/N

## WORK ORDER NON-CONFORMANCE / UPDATE

/ /	•	_
DOA: ANT	Date: [2][1]24.	•
20 V	- 1	*

<del>,</del>	QA Closed: // Date: //											
Work Order:	<u></u>	८७ प्	<u>C</u>		DISPOSITION		}		AGAINST DE	PARTMENT/		
Part No NCR No	· D	412-6 204		209_	Rewori Scraj Use-as-i Work Order Updato	p s	Thern	Skid-tube Machining Moforming Large Fab	Crosstube  Small Fab  Finishing  Composite	!	Water Jet d. Eng. Coor. e/Packaging Supplier	Engineering Quality Other
Root Cause	Date	Step	Qty		otion of work order upda or Non-conformance		Initial nief Eng	Act Descr	tion ription	Sign & Date	Verification	QC Inspector
Doc/Data Equip/Tooling Operator Material Setup Other Process Supplier Training Unapproved	12/11/7	135		TRIM BER DW	HEIGHT PER	· r	123 123 141/7	TRIM HE THIS TUBIZ 18.0".	E16HT FUR	Rm 12-11-7	(PAS) 16 5.5.	Plulia
	······································				·	FAU	T CATE	GORY		. , , , , , , ,		
Landing	Gear				General	······································						
X	Bending Centre No Cracks Crushed/6		ntric to (	1/	Bend BOM/Route Broken/Damaged Burrs		Grain Hardware Inspection Incomplete			Ovalized Over/Under Part Incorred Part Lost/Mi	et	Pressure/Forced Temperature/Cure Weld Wrong Stock Pulled
Crushed/Crimped. Cuffs Heat Treat Inspection Strip in Tube					Contamination Countersink Cut Too Short		Mainte Mislabe Misread	led		Part Moved Positioned V Power Loss/	Vrong	Other
-	Ripples in	•	, une	<b> </b>	Drill Holes	<u> </u>	Offset	4	Ĺ	1 OWEL 1033/	Juige	Joure
-	Torque W		xtrusio	,   <del>-</del>	Drawing	<b> </b>	4	Calibration				
Turning Sequence Finish					1		4	Sequence	•	-		
	Wave/Tw	•			Folio		Outside Dimensions				·	

<b>T</b> 7		$\sim$	1	TT	CAA 10	
$\mathbf{w}$	rk	( )r	101	ID	62040	
7 T U	, I I	$\mathbf{v}$	JUL I	<b>1</b>	UZUTU	

\*62040\*

Page 3

August-27-12	10:12:32 AM			( ) / ( ) 2	+\ /						
Item ID: Revision ID: Item Name:	D412-664-2 Crosstube Lo	09 w Standard Aft	· · · — ·	Accept	*N900	040	100	<b>)</b> * s	Setup Sta	1 7	S1* S2*
Start Date: Required Date Reference:	27/08/2012 : 10/09/2012	Start Qty: 1.00 Req'd Qty: 1.00	*1* *1*		Cust Item Customer:	ID:				1 4	( )/
Approvals:		an:				ate:	·	I	Run Sta Ste	1/1	R1* R2*
Sequence ID/ Work Center I 150 *150*	D	Operation Description QC5- Inspect part comple	teness to step on W/O	Set Up/ Run Hours 0.00	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp OAS
QC Quality Control		Memo *** WEAR I	ATEX GLOVES WHE	0.00 EN HANDLING CROSSTUBE	***						· ·
160 *160* HandFXtube		Memo	ATTEN OF ONE OF MAIN	0.00 0.00					Ø		12-11-8
Hand Finishing Cro	osstudes		ROSSTUBE WITH W.	EN HANDLING CROSSTUBE ASH'N WIPE							
180 *180*		Outsource process - NDT	per QSI038 4.1	0.00				CX)	11/C	08_(7)	<b>1</b>
Outsource2 Outsource process	- NDT	Memo *** WEAR I	LATEX GLOVES WHI	0.00 EN HANDLING CROSSTUBE	***			<u> </u>	<u> </u>	<u>~</u> 0	
		Liquid Penet	rant Inspection as per (	250 128							

Liquid Penetrant Inspection as per QSI 038
Issue P/O: 16362 LPI as per ASTM 1417
Level 2 Attach copy of NDT results to work order

											DQA:	Date	:` <b>•</b>
NCR:	Yes	/ No				WORK ORDER NON-C	OI	NFOR	MANCE / UP	DATE	QA Closed:	 Date	
					·	DISPOSITION				AGAINST DE		ŧ	•
Work Ord	er:						,			_	 1		
	Part No				Rework Scrap Use-as-is Work Order Update	Skid-tube Crosstube  Machining Small Fab  Thermoforming Finishing  Large Fab Composite			1	Water Jet d. Eng. Coor. re/Packaging Supplier	Engineering . Quality Other		
							,			· L	1	''	
Root					Descri	ption of work order update	1	Initial	Act	tion	Sign &	1	
Cause	,	Date	Step	Qty		or Non-conformance	Ch	ief Eng	Desci	ription	Date	Verification	QC Inspector
Doc/Data							1						
Equip/Tooling	<u> </u>											•	
Operator	_												•
Material													
Setup	-												•
Other	<u> </u>								-				
Process	<u> </u>		l										
Supplier	$\vdash$	; 		ł									
Training	-				-					•			
Unapproved		<u> </u>	<u></u>		l		ΔΗ	T CATE	SOBA		İ	<u> </u>	1
Landi	ng (	Gear	· ·			General	101	.i CAIL					
		Bending				Bend		Grain		•	Ovalized		Pressure/Forced
		Centre No	ot Concer	ntric to	o/s	BOM/Route		  Hardwa	re		Over/Under	tolerance	Temperature/Cure
		Cracks				Broken/Damaged		Inspecti	on Incomplete		Part Incorre	ct	Weld
		Crushed/	Crimped.			Burrs		Instruct	ions Incomplete/i	Unclear	Part Lost/M	issing	Wrong Stock Pulled
		Cuffs				Contamination		Mainte	nance		Part Moved		<b></b>
		Heat Trea	it			Countersink		Mislabe	led		Positioned \	Vrong	
		Inspection	n Strip in	Tube		Cut Too Short		Misread	<b>.</b> .		Power Loss/	Surge	Other
		Ripples in	Bend			Drill Holes	Offset						
		Torque W	aves in E	xtrusio	n 🗀	Drawing		Out of (	Calibration				

Outside Dimensions

Turning Sequence

Wave/Twist in Tube

Finish

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Item ID: Revision ID:	D412-664-20	09		Accept	*N900	040	1100	)*	Setup S		*N.	31*	
Item Name:	•	v Standard Aft			-				S	Stop	*NS	<b>S</b> 2*	
Start Date:	27/08/2012	Start Qty: 1.00	*1*		Cust Item	ID:							
Required Date Reference:	: 10/09/2012	Req'd Qty: 1.00	*1*		Customer:								
Approvals:	Process Pla	n:	Date:	Tooling:	D	ate:			Run S	tart	*NF	R1*	
	<b>QC</b> :		Date:	SPC (Y/N):	D	ate:			S	top	*NF	R2*	
Sequence ID/ Work Center	I <b>D</b>	Operation Description		Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty			Insp. Stamp	
190				0.00				<b>Q</b> -3	~~		2	Stamp	
*190*	•	Packaging		,÷ *						//	/ / / · ·	1 4/1	/
Packaging		Memo		0.00							M		/
Packaging		*** WEAR	LATEX GLOVES WI	HEN HANDLING CROSSTUBI	E***						•		
		Ensure copy	of NDT results attach	ed to work order.									
•								+					
200		QC5- Inspect part compl	eteness to step on W/C	0.00							. •	040	
* <b>?</b> 00*	A.							1	٠		(+)	0AS 1	2.1
Quality Control		Memo	LATENCE OF ECONO	0.00				+				9-89	
Quality Control	:		,	HEN HANDLING CROSSTUBI									
		Inspect for o	lamage & ensure result	ts are as per Dwg D412-664-209	)								
204				•0.00									۸.
*2N <b>4</b> *								1	ph		6	/10	ic*
HandFXtube		Memo		0.00							<u> </u>		#  }
Hand Finishing Cr	osstubes	*** WEAR	LATEX GLOVES WE	IEN HANDLING CROSSTUBE	<u>-</u> ***							16-11-	D
		1- PRESSU CROSSTUE	RE WASH AND THE BE BEFORE CHEMIC	N USE WASH'N WIPE TO CLI CAL CONVERSION	EAN								

NCR: Yes / No	WORK ORDER NON-CONF	ORMANCE / UPI	<b>DATE</b> QA CI	osed:
Work Order:	DISPOSITION		AGAINST DEPARTM	
Work Order.	Rework	Skid-tube	Crosstube	W

	QA Closed: Date:												
Work Orde	or.					DISPOSITION				AGAINST DE	PARTMENT,	/PROCESS	
Part N	-					Rework Scrap			Skid-tube Machining	Crosstube Small Fab	Pro	Water Jet d. Eng. Coor.	Engineering Quality
NCR N	-					Use-as-is Use-as-is Work Order Update		Thermoforming Finishing  Large Fab Composite			4	re/Packaging Supplier	Other
Root					Descri	ption of work order update	ln	Initial Action			Sign &		
Cause		Date	Step	Qty	C	or Non-conformance	Chie	ief Eng Description			Date	Verification	QC Inspector
Doc/Data													
Equip/Tooling Operator	$\dashv$											i	
Material	T						1						
Setup													
Other			ŀ										
Process									£				
Supplier													
Training													
Unapproved												1	
						F	AULT	CATE	GORY				
Landir	ng G	ear				General							
	*-	Bending				Bend		Grain			Ovalized	[	Pressure/Forced
		Centre No	ot Concer	ntric to (	o/s	BOM/Route	П	Hardwa	re		Over/Under	tolerance-	Temperature/Cure
		Cracks				Broken/Damaged		nspecti	on Incomplete		Part Incorre	ct	Weld
		Crushed/	Crimped.			Burrs		nstruct	ions Incomplete/	/Unclear	Part Lost/M	issing	Wrong Stock Pulled
] [		Cuffs				Contamination		Mainte	nance		Part Moved	_	<u> </u>
		Heat Trea	at			Countersink		Mislabe	led		Positioned V	Vrong	
	Inspection Strip in Tube					Cut Too Short		Misreac	1		Power Loss/	'Surge [	Other
		Ripples in	Bend			Drill Holes		Offset					
		Torque <b>W</b>	/aves in E	xtrusio	, [	Drawing		Out of 0	Calibration				
		Turning S	equence			Finish		Out of S	Sequence	•			
	Wave/Twist in Tube					Folio	Outside Dimensions						

DQA:

Date:

W	ork	Or	der	ID	620	40
*						

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Page 5

Item ID: Revision ID:	D412-664-20			Accept	<b>N</b> 900	<b>040</b>	100	)*	Setup	Start	171.	S1*
Item Name:		w Standard Aft								Stop	*N:	S2*
Start Date:	27/08/2012	Start Qty: 1.00	*1*		Cust Item I	D:						
Required Date Reference:	: 10/09/2012	Req'd Qty: 1.00	*1*		Customer:							
Approvals:	Process Pla	in:	Date:	Tooling:	D	ate:			Run	Start	I/I	R1*
	QC:	·	Date:	SPC (Y/N):	<b>D</b>	ate:				Stop	*N	R2*
Sequence ID/ Work Center I	D	Operation Description		Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accep Qty	t Re Qt	ject y	Reject Number	Insp. Stamp
206		QC7-Inspect Chemical	Conversion Coat	0.00								
*206*		Memo		0.00							<del></del>	05 12-1
Quality Control		*** WEAR	LATEX GLOVES WHE	EN HANDLING CROSSTUBE*	**							૭-૧૭
210				0.00								
*210*		Crosstubes		0.00				1		Ø	6	AR
Crosstubes Crosstubes		Memo *** WEAR	LATEX GLOVES WHI	0.00 EN HANDLING CROSSTUBE*	**					•	,	12-11-8
		1-Rivet Cu	ffs as per Dwg D412-664	4-249. with Sika flex in Between								

											DQA:	Date	e: <u> </u>	
NCR:	Yes	/ No				WORK ORDER NON-C	100	NFOR	MANCE / UPDATE		OA Classid	Date	•	
						T	-				QA Closed:	Date	e: 	
Work Orde	or.					DISPOSITION			A	GAINST DEI	PARTMENT,	/PROCESS		
WOIK OIG	C1					Rework			Skid-tube Cro	osstube		Water Jet	Engineering	
Part I	Vo.					Scrap			<b>⊢</b>	nall Fab	Pro	d. Eng. Coor.	Quality	
	_					Use-as-is			~ <b>—</b>	inishing		re/Packaging	Other	
NCR I	Vo.					Work Order Update			<del></del>	nposite		Supplier		
							4							
Root					Descri	ption of work order update		nitial	Action		Sign &			
Cause		Date	Step	Qty	•	or Non-conformance	Ch	ief Eng	Description	1	Date	Verification	QC Inspector	
Doc/Data	Ш													
Equip/Tooling	Ш													
Operator	Ш					•								
Material														
Setup	L.													
Other														
Process	Ш				,					i		1		
Supplier	Ш													
Training	Ш													
Unapproved							<u> </u>							
							AUL	T CATE	GORY				· · · · · · · · · · · · · · · · · · ·	
Landi					<del></del>	General		1			1	_	· · · · · · · · · · · · · · · · · · ·	
	$\vdash$	Bending			. <b> </b>	Bend		Grain			Ovalized	_	Pressure/Forced	
	Centre Not Concentric to O/S					BOM/Route	_	Hardwa			Over/Under		Temperature/Cure	
	Cracks					Broken/Damaged		1	ion Incomplete		Part Incorre	<del> -</del>	Weld	
	-	Crushed/0	Crimped.		_	Burrs	<u> </u>	Instructions Incomplete/Unclear			Part Lost/Missing		Wrong Stock Pulled	
	-	Cuffs			_	Contamination		Mainte		<b>⊢</b>	Part Moved			
	Heat Treat					Heat Treat Countersink Mislabeled Positioned Wrong								

Misread

Out of Calibration

Out of Sequence

Outside Dimensions

Offset

Power Loss/Surge

Other

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Ripples in Bend

Turning Sequence

Wave/Twist in Tube

Inspection Strip in Tube

Torque Waves in Extrusion

Cut Too Short

Drill Holes

Drawing

Finish Folio

Work Order		040		*62040*							·	Page	6
Revision ID: Item Name: Co	7/08/2012	9 Standard Aft Start Qty: 1.00 Req'd Qty: 1.00	*1* *1*	Accept	*N900  Cust Item I Customer:		100	)*	Setup	Start Stop	1 4	S1* S2*	
Approvals: P	Process Plan	n:	Date:	Tooling: SPC (Y/N):		 nte:			Run	Start Stop	"I <b>V</b>	R1* R2*	
Sequence ID/ Work Center ID 220 *20^*		Operation Description SprayPaint	······································	Set Up/ Run Hours 0.00	Tool ID	Tool #	Plan Code	Accept Qty	t Rej Qty		Reject Number	Insp. Stamp	
SprayPaint Spray Painting		Memo *** WEAR * <u>**Mask ur</u> 1-Prime ins	nderside of crosstube as side and outside crosstube		C***				_			<u>`05</u>	_1 <b>à</b> -1+K

230 QC14- Inspect Spray Paint

0.00

\*23U\*

Memo

0.00

Quality Control

Then, Wrap in plastic bag to protect from scratches

A TT 12-11-11 (1)

			DQA:	Date:	
NCR:	Yes / No	WORK ORDER NON-CONFORMANCE / UPDATE			•

										·	QA Closed:	Date	<u>;</u>
Work Orde	er:					DISPOSITION				AGAINST DE	PARTMENT	/PROCESS	
Part f	No.					Rework Scrap Use-as-is Work Order Update		I Thern	Skid-tube  Machining  noforming  Large Fab	Crosstube Small Fab Finishing Composite	4	Water Jet d. Eng. Coor. re/Packaging Supplier	Engineering Quality Other
Root					Descri	ption of work order update	In	itial	Act	tion	Sign &		
Cause		Date	Step	Qty	(	or Non-conformance	Chie	ef Eng	Desci	ription	Date	Verification	QC Inspector
Doc/Data										<del>//</del>			
Equip/Tooling			ļ								1		
Operator						•							
Material	,			1									
Setup •											·		
Other	$\vdash$												
Process													
Supplier	<del>  </del>				·								
Training													
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Landi		3				General	г				7	F-	
		Bending				Bend	$\vdash$	Grain		-	Ovalized	-	Pressure/Forced
		Centre No	ot Concer	ntric to	<sup>O/S</sup>	BOM/Route		Hardwa			Over/Under	<b>⊢</b>	Temperature/Cure
		Cracks			<u> </u>	Broken/Damaged	$\vdash$	•	ion Incomplete	_	Part Incorre	<b>-</b>	Weld
	Crushed/Crimped			Burrs	<b> </b>		ions Incomplete/	Unclear	Part Lost/Mi	ssing _	Wrong Stock Pulled		
	Cuffs			Contamination			enance	ļ	Part Moved				
					Countersink	-	<b>∀</b> islabe		<u> </u>	Positioned V		<b>—</b> .	
				Cut Too Short	-	Misread	t		Power Loss/	Surge	Other		
	<u> </u>	Ripples in				Drill Holes	$\vdash$	Offset					
	<u> </u>	Torque W			¹	Drawing	$\vdash$		Calibration				
	$\vdash$	Turning S			ļ	Finish	Out of Sequence						
						Folio	Outside Dimensions						

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Work Orde	0:12:32 AM		··· <del>···</del> ··· · · · · · · · · · · · · ·	*620	" <u>.</u> "				
Revision ID:	D412-664-20 Crosstube Low		<u> </u>	Accept	*N900	<b>10</b> 10	Setup Sta	14771	
Start Date: Required Date: Reference:	27/08/2012 10/09/2012	Start Qty: 1.00 Req'd Qty: 1.00	*1* *1*		Cust Item I Customer:	D:			
Approvals:	Process Plan	n:	Date:	Tooling: SPC (Y/N):	Date:			Run Sta Sto	"NK1"
Sequence ID/ Work Center II 240		Operation Description		Set Up/ Run Hours 0.00	Tool ID	Tool # Pla Co		Reject Qty	Reject Insp. Number Stamp
*240* Crosstubes		up. A/R Prosea  2- Lightly so with 41058	Batch: 123 \o 3 EXP: 03   13 euff the bonded area using wash 'n' wipe	0.00 0412-664-249.Top holes sl 0_ 0_ 03 a 320 grit sand paper and	I clean the area	Siyshiet Ger E	! Rev, C - 3 CN 1264	ee Da	- Habed for place

D12-664-249 using installation jig DT9024. Torque clamps as per dwg

A/R Scotch-Weld DP460 Batch: 122900

EXP: \\_\circ\gamma\g

4-Install nut plates as per Dwg D412-664-249 Touch-up rivet heads with Imron paint.

250

QC5- Inspect part completeness to step on W/O

0.00

\*250\*

Memo

Quality Control

0.00

es / No				MODIL ODDED NON							
		WORK ORDER NON-CONFORMANCE / UPDATE								Date:	•
··				DISPOSITION					QA Closed: PARTMENT,	<del></del>	
o				Rework Scrap Use-as-is Work Order Update		Therm	Machining of orming	Crosstube Small Fab Finishing Composite			Engineering Quality Other
			Descri	ption of work order update		nitial	Ac <sup>-</sup>	tion	Sign &		
Date	Step	Qty	(	or Non-conformance	Ch	ief Eng	Desc	ription	Date	Verification	QC Inspector
				F	Δ 11	T CATE	5ORY	·			
g Gear				**************************************	701	. CATE	JONI				
Centre Not Concentric to O/S Cracks Crushed/Crimped. Cuffs Heat Treat Inspection Strip in Tube Ripples in Bend				Bend BOM/Route Broken/Damaged Burrs Contamination Countersink Cut Too Short Drill Holes		Inspecti Instruct Mainte Mislabe Misreac Offset	on Incomplete ions Incomplete/ nance led		Over/Under Part Incorre Part Lost/M Part Moved Positioned V	ct issing Vrong	Pressure/Forced Temperature/Cure Weld Wrong Stock Pulled Other
	Date  Bending Centre N Cracks Crushed/ Cuffs Heat Treat Inspection Ripples in	Date Step  Date Step  Gear  Bending  Centre Not Concer  Cracks  Crushed/Crimped  Cuffs  Heat Treat  Inspection Strip in  Ripples in Bend	Date Step Qty  Date Step Qty  Gear  Bending Centre Not Concentric to C Cracks Crushed/Crimped. Cuffs Heat Treat Inspection Strip in Tube Ripples in Bend	Date Step Qty  Gear  Bending  Centre Not Concentric to O/S  Cracks  Crushed/Crimped  Cuffs  Heat Treat  Inspection Strip in Tube	Rework Scrap Use-as-is Work Order Update  Date Step Qty Description of work order update or Non-conformance  Fagear General Bending Bend Centre Not Concentric to O/S Cracks Broken/Damaged Crushed/Crimped Burrs Cuffs Contamination Heat Treat Countersink Inspection Strip in Tube Ripples in Bend Drill Holes	Rework Scrap Use-as-is Work Order Update  Date Step Qty  Description of work order update or Non-conformance  FAUL Gear Bending Centre Not Concentric to O/S Cracks Crushed/Crimped Curthed Burrs Curthed Contamination Heat Treat Inspection Strip in Tube Ripples in Bend  Rework Scrap Use-as-is Work Order Update Or Non-conformance  FAUL General Bend Bend Bend Bend Bend BoM/Route Contamination Contamination Countersink Cut Too Short Drill Holes	Rework Scrap Use-as-is Work Order Update Date Step Qty Or Non-conformance Chief Eng    Date   Step Qty   Description of work order update or Non-conformance   Chief Eng	Rework Scrap Use-as-is Work Order Update Step Qty Or Non-conformance Chief Eng Desc  Bending Centre Not Concentric to O/S BOM/Route Cracks Broken/Damaged Cracks Broken/Damaged Crushed/Crimped. Cuffs Contamination Maintenance Heat Treat Countersink Inspection Strip in Tube Ripples in Bend Drill Holes Orffset  Rework Scrap Machining Thermoforming Large Fab Scrap Mac	Rework Scrap Use-as-is Work Order Update Date Step Qty Description of work order update Date Step Qty Order Update Date Step Qty Order Update Date Step Qty Order Update Or Non-conformance Chief Eng Description    Date Step Qty Order Update Or Non-conformance Chief Eng Description	Rework Scrap Use-as-is Work Order Update Use-as-is Work Order Update Initial Action Composite Date Step Oty Or Non-conformance Centre Not Concentric to O/S BOM/Route Broken/Damaged Control Non-conformate Drill Holes Offset    Rework Scrap Wachining Small Fab Rec/Stor Machining Finishing Rec/Stor Composite Date Step Oty Or Non-conformance Date Description Date Sign & Composite Date Date Date Date Date Date Date Da	Rework Scrap Use-as-is Use-as-is Work Order Update Date Step Qty Or Non-conformance Chief Eng Description Date Verification  FAULT CATEGORY  Gear General Bending Centre Not Concentric to O/S Cracks Broken/Damaged Cracks Gracks

Outside Dimensions

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Turning Sequence

Wave/Twist in Tube

Finish

Work Ord				*6204	<b>4</b> 0*	. *.	. <u></u> :			Page
Item ID: Revision ID: Item Name:	D412-664-20 Crosstube Lov	09 w Standard Aft	and the second s	Accept	*N900040	100*	Setup	Start Stop	171.7	11*
Start Date: Required Date: Reference:	27/08/2012 : 10/09/2012	Start Qty: 1.00 Req'd Qty: 1.00	*1* *1*		Cust Item ID: Customer:					
Approvals:	Process Pla	ın:	Date:	Tooling:	Date:	_	Run	Start	"INH	<b>?</b> 1*
	QC:		Date:	SPC (Y/N):	Date:			Stop	*NR	?2*
Sequence ID/ Work Center II 260 *260* QC Quality Control	D	Operation Description QC4- 100% Inspect ki	its for completeness	Set Up/ Run Hours 0.00 0.00 0.00 0.00 0.00	Tool ID Tool #		ccept Repty Qt	ject y	-	nsp. Stamp
270 *270* Packaging Packaging		Packaging <b>Memo</b> Identify a	nd pack for shipping as per	0.00 Raas 0.00 PPP D412-664-209		Ō	) Z	12	111125	P

0.00

0.00

MLJ 12-11-12 MLJ 12-11-12

Page 8

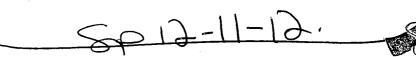
QC21- Final Inspection - Work Order Release

Memo

280

\*280\*

Quality Control



NCR: Ye	es / <b>N</b> o				WORK ORDER NON-O	CONF	ORN	//ANCE / UPD	ATE			•
				<del></del> i				·		QA Closed:	Dat	e:
Work Orde	r:				DISPOSITION				AGAINST DE	PARTMENT	/PROCESS	
Part N	0.				Rework Scrap Use-as-is		ľ	Skid-tube Machining noforming	Crosstube Small Fab Finishing	i	Water Jet d. Eng. Coor.	Engineering Quality Other
NCR N	0				Work Order Update	]   '		Large Fab	Composite	Nec/Stol	Supplier	Other
Root				Descri	ption of work order update	Init	tial	Actio	on	Sign &	· ·	
Cause	Date	Step	Qty		or Non-conformance	Chief	f Eng	Descri	ption	Date	Verification	QC Inspector
Doc/Data												
quip/Tooling												
Operator							1			<u> </u>		
Material						_						•
Setup												
Other		l ·										
Process												
Supplier								-				
Fraining												
Jnapproved							•					·
		•			F.	AULT (	CATE	GORY				
Landin	g Gear				General				· · · · · ·	-	_	
_	Bending				Bend	G	rain			Ovalized		Pressure/Forced
L	Centre No	ot Conce	ntric to C	)/S	BOM/Route	L Ha	ardwa	re		Over/Under	tolerance	Temperature/Cure
	Cracks				Broken/Damaged	∐ In:	specti	on Incomplete		Part Incorre	ct	Weld
L	Crushed/	Crimped.			Burrs	ln:	structi	ons Incomplete/U	nclear	Part Lost/Mi	ssing	Wrong Stock Pulled
-	Cuffs				Contamination	Шм	lainte	nance		Part Moved		
	Heat Trea	it		L	Countersink	Шм	islabe	led		Positioned V	Vrong _	
	Inspection	n Strip in	Tube		Cut Too Short	Шм	isread			Power Loss/	Surge [	Other
	Ripples in	Bend			Drill Holes	Of	ffset					
	Torque W	aves in E	xtrusion		Drawing		ut of C	alibration				

Outside Dimensions

DQA: \_\_\_\_\_Date: \_\_\_

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

Turning Sequence

Wave/Twist in Tube

Finish

## · Picklist Print

August-27-12 10:12:43 AM

Work Order ID: 62040

\*62040\*

D412-664-209

Parent Item Name: Crosstube Low Standard Aft

\*D412-664-209\*

**Start Date: 27/08/2012** 

**Required Date:** 10/09/2012

Start Qty: 1.00

Required Qty: 1.00

**Comments:** 

Parent Item:

IPP Rev:A New Issue 07.09.12 EC verified by: JLM IPP Rev:B ECN 1100 08-01-11 DD verified by EC IPP Rev:C ECN 1121 08-02-25 DD verified by:EC IPP Rev:D 08-06-12 add comment in seq. 24 DD verified

by:EC

IPP REV:E

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
22856-600		Manufactured	No			· · · · · · ·	f	222.0700	<del></del>	1.68	**************************************	P	
D2856-6	<b>NN*</b>	/							**	- · <del></del>			AM
brasion Strip	1 Alia -	$\mathcal{N}$		Location	ļ.	<u>Lc</u>	c Oty	Loc Code					
	146. C			ST403		•	108				_		
	0.0	Model			37668 79692		0 108		_		_		
	H	stlected DEO		ST409	17072		114.07		_		_		
		DEU			25656		2				_		
		JV -			26650		4		_		<del>-</del>		
,					37668 87087		0.07 108				-		
N960JD616	NAS1149D0663J	Purchased	No			100	Each	0.0000	18	18	_		
AN960.1F	0616*	SMS							**	m	1232	655	7-11-12
0412-664-209TRN		Manufactured	No			140	Each	4.0000	1	1		(2-	1/-/)
D412-66	4-209TF	N*							**				·

Location	Loc Qty	Loc Code
LG003 91695	4	
63235	1	
63236	1	
65271	1	
65272	1	

								•			DQA:	Date:	
NCR:	Yes	/ No				WORK ORDER NON-	CO	NFORM	MANCE / UPDATE				•
						_		<u> </u>			QA Closed:	Date:	`
Work Ord	er:					DISPOSITION			A	GAINST DE	PARTMENT	/PROCESS	
Part NCR	No.					Rework Scrap Use-as-is Work Order Update	Machining Sn noforming Fi	osstube nall Fab inishing mposite	Prod. Eng. Coor. Quality Consider Supplier Other				
Root					Descri	ption of work order update		Initial Action			Sign &		
Cause		Date	Step	Qty	(	or Non-conformance	Cr	nief Eng	Description	1	Date	Verification	QC Inspector
Doc/Data				,									
Equip/Tooling													
Operator													
Material													
Setup			İ										
Other													
Process													
Supplier	П												
Training													
Unapproved													
							FAUI	LT CATE	GORY				
Landing Gear Ge						General				-	• •		
	Bending Bend							Grain			Ovalized		Pressure/Forced
	Centre Not Concentric to O/S					BOM/Route		Hardwa	re		Over/Under	tolerance	Temperature/Cure
	Cracks					Broken/Damaged		Inspecti	on Incomplete		Part Incorre	ct	Weld
Crushed/Crimped.						Burrs		4	ions Incomplete/Unclea	r	Part Lost/Mi	ssing	Wrong Stock Pulled
						Contamination		Mainte	•		Part Moved	- <b>L</b>	, -
		Heat Trea	it			Countersink		Mislabe			Positioned V	Vrong	
	Inspection Strip in Tube					Cut Too Short	Misread				Power Loss/	Other	

Offset

Out of Calibration

Out of Sequence

Outside Dimensions

Turning Sequence

Wave/Twist in Tube

Ripples in Bend

Torque Waves in Extrusion

Drill Holes

Drawing

Finish

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

August-27-12 10:12:44 AM

Work Order ID: 62040

\*62040\*

Parent Item:

D412-664-209

\*D412-664-209\*

Parent Item Name: Crosstube Low Standard Aft

**Start Date: 27/08/2012** 

**Required Date:** 10/09/2012

Start Qty: 1.00

Required Qty: 1.00

D3660-1

Manufactured

No

220

20.0000 Each

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\*D3660-1\*

Location	<u> </u>	Loc Qty	Lo	c Code				
LG	B89249	2			_	$\underline{\hspace{1cm}}$	KM	12-11-7
	80359	2						
ST477		10			_			
	87445	10						
ST482		8			_			
	53501	1						
	76983	1						
	88394	6						
	240	Eac	ch 4	68.0000	44	44		

CR3212-4-07

Purchased

Manufactured

No

No

12-11-8

\*CR3212-4-07\*

CHERRY RIVET

<b>Location</b>	Loc	<u>Qtv</u>	Loc Code
ST329		100	
122378		100	
ST331		368	
104071		111	
109840		257	
	240	Each	14.0000

\*D2896-1\*

Support

D2896-1

88695

Location		Loc Oty	Loc Code
LG052		6	
	80586	6	
LG053		8	
	74465	8	

**Shop Packet Print** 

												DQA:	Dat	.e:	•
NCR:	Yes	. / No				WORK ORDER NON-	COI	NFORM	/ANCE / UP	DATE		QA Closed:	Dat	to:	
					<del></del>						_			е.	
Work Ord	er:					DISPOSITION				AGAINST	DE	PARTMENT,	/PROCESS		
Part <sup>•</sup>	No.	· · · · · · · · · · · · · · · · · · ·				Rework Scrap Use-as-is		Therm	Skid-tube  Machining  noforming	Crosstube Small Fab Finishing		-	Water Jet d. Eng. Coor. e/Packaging		Engineering Quality Other
NCR ·	No.			-		Work Order Update	J		Large Fab	Composite			Supplier		
Root					Descri	ption of work order update		Initial	Ac	tion		Sign &			
Cause		Date	Step	Qty	(	or Non-conformance	Ch	ief Eng	Desc	ription		Date	Verification	1	QC Inspector
Doc/Data Equip/Tooling Operator Material Setup Other Process Supplier Training Unapproved															
						·	AUL	T CATE	GORY						
Landi		1			_	General	_	1		-		1	,		1
		Bending Centre No Cracks Crushed/ Cuffs Heat Trea	Crimped.	ntric to (	)/S	Bend BOM/Route Broken/Damaged Burrs Contamination Countersink		4	on Incomplete ions Incomplete/ nance	'Unclear		Ovalized Over/Under Part Incorred Part Lost/Mi Part Moved Positioned V	ct ssing		Pressure/Forced Temperature/Cure Weld Wrong Stock Pulled
		Inspectio	n Strip in	Tube		Cut Too Short		Misread	l	-	_	Power Loss/	Surge	l	Other

Offset

Out of Calibration

Out of Sequence

Outside Dimensions

Ripples in Bend

Turning Sequence

Wave/Twist in Tube

Torque Waves in Extrusion

Drill Holes

Drawing

Finish

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

## · Picklist Print

August-27-12 10:12:44 AM

Work Order ID: 62040

D412-664-209

Parent Item Name: Crosstube Low Standard Aft

\*62040\*

Location

\*D412-664-209\*

**Start Date:** 27/08/2012

**Required Date:** 10/09/2012

Page 3

Start Qty: 1.00

Required Qty: 1.00

\*\*

\*D3189-1\*

Chafing Shield

D3189-1

Parent Item:

Manufactured

FG 36065 LG052 86652 LG053

76546

No

26 26 13 85515 11 89028 2 240 Each

240

Each

Loc Qty

Loc Code

131.0000

43.0000

\*\*

D3595-063-570

Manufactured No

**RUBBER CUSHION** 

Locat	<del></del>	Loc Qty	Loc Code
FG	•	8	
	37971	1	
	42243	7	
LG		78	
	83294	78	
MAT	052	45	
	71534	1	

August-27-12 10:12:44 AM

											DQ	A:	Date:	•
NCR:	Yes	/ No	•			WORK ORDER NON-O	COI	NFORM	AANCE / UP	DATE				•
			.,								QA Close	d:	Date:	
Work Ord	or.					DISPOSITION				AGAINST DE	PARTMEN	NT/PRO	OCESS	·
Part f	No.					Rework Scrap Use-as-is Work Order Update		Therm	Skid-tube  Machining noforming  Large Fab	Crosstube Small Fab Finishing Composite	] P	rod. Er tore/P	Vater Jet ng. Coor. ackaging Supplier	Engineering Quality Other
Root					Descri	ption of work order update		Initial	Ac1	tion	Sign &			
Cause		Date	Step	Qty	(	or Non-conformance	Ch	nief Eng	Desc	ription	Date		erification	QC Inspector
Doc/Data Equip/Tooling Operator Material Setup Other Process Supplier Training Unapproved														
						<b></b>	AUI	LT CATE	GORY					
Landi		Bending Centre N Cracks Crushed/ Cuffs Heat Trea Inspectio	Crimped at on Strip in		D/S	General Bend BOM/Route Broken/Damaged Burrs Contamination Countersink Cut Too Short		Instruct Mainte Mislabe Misread	on Incomplete ions Incomplete/ enance eled	Unclear	Ovalized Over/Und Part Incom Part Lost, Part Mov Positione Power Lo	rrect /Missin ed d Wror	g	Pressure/Forced Temperature/Cure Weld Wrong Stock Pulled
ļ	1	Ripples in	n Bend		1	Drill Holes	1	Offset						

Out of Calibration

Out of Sequence

Outside Dimensions

Turning Sequence

Wave/Twist in Tube

Torque Waves in Extrusion

Drawing

Finish

August-27-12 10:12:44 AM									Page 4
Work Order ID: 62040	···	*6′	2040*						
Parent Item: D412-664-209				100+					
Parent Item Name: Crosstube Low	/ Standard Δft	"1)	412-664-2	/119*		6	4 B 4	27/09/2012	D 1 10/00/2012
Tarent item Name. Crosstage Bow	Standard Art		•	•				27/08/2012	Required Date: 10/09/2012
							Start Qty:	1.00	Required Qty: 1.00
MS21920-28	Purchased	No		240	Each	78.0000	4	4	-
*MS21920-28* Clamp(per MIL-DTL-8783C)							**		N1 12·11·11
			<b>Location</b>	Lo	e Qty	Loc Code			
			FG		5				<u>·</u>
			105884		5				_
	.1 ,		LG050		55				_
	B# 123243		118713		3			10	<u> </u>
	D Mari		120054 122518		2 50				_
			LG051		18				
			121440		8				
			122204		10				_ ^
MS21920-30	Purchased	No		240	Each	79.0000	2	2	<sup></sup> //
*MS21920-30* clamp(per MIL-DTL-8783C)							**		W/12.11 11
			<b>Location</b>	<u>L</u> c	oc Qty	Loc Code			
			LG		16				_
			119529		16	* .		-	<u>.                                    </u>
			LG051		63			444	
			111258		14				<u> </u>
1217 404			121583		49				<u> </u>
AN6-40A	Purchased	No		260	Each	122.0000		4	
*AN6-40A*							**	-56	p12-11-12 8
- 2			<b>Location</b>	<u>L</u> c	oc Otv	Loc Code			
2M2			ST340		50			1.	
			122416		50			A)X	
			ST342		72				<u></u>
			120187		66				
			120833		4				

· Picklist Print

121827

											DQA:	Date	:·
NCR: Y	⁄es	/ No				WORK ORDER NON-	100	NFORM	MANCE / UPDATE		QA Closed:	Date	
						DICROCITION		<u> </u>	ACAIN	CT DE	***		·
Work Orde	er:					DISPOSITION			AGAIN	31 DE	PARTMENT,	/PROCESS	
Part N	_					Rework Scrap Use-as-is Work Order Update		Therm	Skid-tube Crosstu Machining Small F noforming Finishi Large Fab Compos	ab ng	4	Water Jet d. Eng. Coor. re/Packaging Supplier	Engineering Quality Other
Root					Descri	ption of work order update	П	Initial	Action		Sign &		
Cause		Date	Step	Qty	(	or Non-conformance	Ch	nief Eng	Description		Date	Verification	QC Inspector
Doc/Data													
Equip/Tooling													
Operator											}		
Material	П												
Setup	П												
Other	П												
Process	П												
Supplier	П		j										
Training	П												
Unapproved	П					·							
						F	AUI	LT CATE	GORY				
Landi	ng G	ear				General		_			_		_
		Bending				Bend		Grain			Ovalized	L	Pressure/Forced
		Centre <b>N</b> o	ot Concer	ntric to (	o/s	BOM/Route		] Hardwa	re		Over/Under	tolerance	Temperature/Cure
'		Cracks				Broken/Damaged		Inspecti	on Incomplete		Part Incorre	ct _	Weld
		Crushed/	Crimped.			Burrs		Instruct	ions Incomplete/Unclear		Part Lost/M	issing	Wrong Stock Pulled
		Cuffs				Contamination		Mainte	nance		Part Moved		
		Heat Trea	it			Countersink		] Mislabe	led		Positioned \	<b>N</b> rong	_
		Inspection	n Strip in	Tube		Cut Too Short		Misread	I		Power Loss/	/Surge	Other
		Ripples in	Bend			Drill Holes		Offset			_		

Out of Calibration

Out of Sequence

Outside Dimensions

Turning Sequence

Wave/Twist in Tube

Torque Waves in Extrusion

Drawing

Finish

August-27-12 10:12:44 AM

Work Order ID: 62040

Parent Item:

D412-664-209

Parent Item Name: Crosstube Low Standard Aft

\*62040\* \*D412-664-209\*

Location

122407

120423

121825

120308

ST340

ST342

**Start Date:** 27/08/2012

**Required Date:** 10/09/2012

Start Qty: 1.00

Required Qty: 1.00

AN6-41A

MS21042L6

Purchased

Purchased

No

No

260

Each

Loc Qty

50

39

30

200

9

Each

89.0000

Loc Code

\*\*

869.0000

Location Loc Qty Loc Code 314 578 122441 578 ST300 291 117677 25 118384 3 118927 48 119075 15

260

NCR:	Yes	/ No				WORK ORDER NON-	100	NFORM	MANCE / UP[	DATE			•
											QA Closed:	Date:	
Work Orde	er: _					DISPOSITION	7			AGAINST DE	PARTMENT,		1
Part I	-					Rework Scrap Use-as-is Work Order Update		t Thern	Skid-tube  Machining  noforming  Large Fab	Crosstube Small Fab Finishing Composite	4	Water Jet d. Eng. Coor. re/Packaging Supplier	Engineering Quality Other
Root		Data	Chara	04		ption of work order update	Į.	Initial	Act		Sign &	Verification	QC Inspector
Cause	- 1	Date	Step	Qty	(	or Non-conformance	Cr	nief Eng	Descr	iption	Date	verification	QC ITSPECTOR
Doc/Data Equip/Tooling Operator Material Setup Other Process Supplier Training Unapproved													
<u> </u>							AUI	LT CATE	GORY				
Landi		Bending Centre No Cracks Crushed/ Cuffs Heat Trea Inspectio Ripples in	Crimped at n Strip in n Bend	Tube		General Bend BOM/Route Broken/Damaged Burrs Contamination Countersink Cut Too Short Drill Holes		Instruct Mainte Mislabe Misread Offset	ion Incomplete tions Incomplete/U enance eled d	Jnclear	Ovalized Over/Under Part Incorred Part Lost/M Part Moved Positioned V Power Loss/	ct sissing Vrong	Pressure/Forced Temperature/Cure Weld Wrong Stock Pulled Other
		Torque W	aves in E	Extrusio	n [	Drawing		Out of 0	Calibration				

Outside Dimensions

DQA:

Date:

Turning Sequence

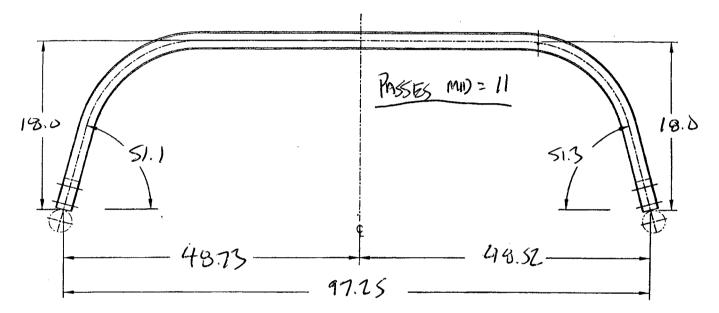
Wave/Twist in Tube

Finish

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

DART AEROSPACE LTD	Work Order:	62040
Description: Crosstube Low Aft (412)	Part Number:	D412-664-209
Inspection Dwg: D412-664-249 Rev: B		Page 1 of 1

Required Dimension	Min	Max
Height	17.78	18.04
1/2 Span	48.55	48.81
Angle	49	52
Total Span	97.1	97.62
Bending Passes	8 .	
Crushing		6% / 10%



	Side A	Side B
Bending Passes	13	10 ,
Crushing	6.6%	5.8%
	Comments	
Cut tube	18.0" hich.	One width narrow,
which is acco	otable.	
		812/1V2
	Da	
	7,00	
QC15 Insp	ection 🧸 🦪	
Date	17./	11/7

Rev	Date	Change	Revised by	Approved
A	08.02.29	New Issue	KJ/JM 40	
В	12.04.16	Added bending, crushing dimensions	KJ -	W

										DQA:	Date:	
NCR:	es / No				WORK ORDER NON-C	CON	IFORM	MANCE / UPI	DATE			
		,			_				···	QA Closed:	Date:	
Work Orde	ar.				DISPOSITION				AGAINST DE	PARTMENT,	/PROCESS	
Part No.					Rework Scrap Use-as-is		ſ	Skid-tube Machining noforming	Crosstube Small Fab Finishing	₹	Water Jet d. Eng. Coor. re/Packaging	Engineering Quality Other
NCR N	lo				Work Order Update			Large Fab	Composite		Supplier	
Root				Descri	ption of work order update	lr	nitial	Act	ion	Sign &		
Cause	Date	Step	Qty	(	or Non-conformance	Chi	ief Eng	Descr	ription	Date	Verification	QC Inspector
Doc/Data												
Equip/Tooling												
Operator												
Material												
Setup												
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	Cracks				Broken/Damaged	Ш	Inspecti	on Incomplete		Part Incorre	ct	Weld
	Crushed/	Crimped,			Burrs			ions Incomplete/l	Jnclear	Part Lost/M	issing	Wrong Stock Pulled
Cuffs					Contamination		Maintenance			Part Moved		

Mislabeled

Out of Calibration

Out of Sequence

Outside Dimensions

Misread

Offset

Positioned Wrong

Power Loss/Surge

Other

H:/FQRMS/Quality Assurance\approved QA/NCRWO Rev G

Ripples in Bend

Turning Sequence

Wave/Twist in Tube

Heat Treat

Inspection Strip in Tube

Torque Waves in Extrusion

Countersink

Cut Too Short

Drill Holes

Drawing

Finish

Item	Qty -249	Part Number	Description
1	x	D412-664-249	CROSSTUBE ASSEMBLY (412 LOW AFT)
2	_ 1	D6009-129	CROSSTUBE
3	2	D2856-600-1009	ABRASION STRIP
4	1	D2896-1	SUPPORT
5	2	D3189-1	CHAFING SHIELD
6	2	D3595-063-570	RUBBER CUSHION
7	2	D3660-1	CUFF
8	44	CR3212-4-07	RIVET (OR M7885/3-4-07)
9	4	MS21920-28	CLAMP
10	2	MS21920-30	CLAMP (OR MS21920-32)
11	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
12	A/R	SIKAFLEX-241/-291	SEALANT (UR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT)

## **GENERAL NOTES:**

D

С

В

- 1) MATERIAL: MANUFACTURED FROM D6009-129
- FINISHED LENGTH = 127.826±0.020 (BEFORE BENDING/TRIMMING)
- CHEMICAL CONVERSION COAT PER DART QSI 005 4.1 PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
  PAINT OUTSIDE PER DART QSI 005 4.2

- 3) TOLERANCES ARE PER DART GSI 018 UNLESS OTHERWISE NOTED.
  4) UNITS: INCHES UNLESS OTHERWISE NOTED.
  5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
  6) IDENTIFICATION: SCRIBE DART PART NUMBER "D412-664-249" AND BATCH NUMBER ON INSIDE OF CUFF
- USING VIBRATING STYLUS.
- WEIGHT: 42.5 lbs (PER IIN-D212-664)
  PART IS SYMMETRIC ABOUT CENTERLINE.
- WHEN MACHINING TAPER, RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALY, TRANSITION SHOULD BE SMOOTH
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D., EXCEPT UP TO 10% IS ALLOWED IN AREA NOTED.

  11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PR QSI 038.

  12) INSTALL DESSET SUPPORT USING 0.03\* TO 0.05\* THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF
- D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER
- D299-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER OSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.

  13) INSTALL MS21920-30 CLAMPS (OR 32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE THE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.

  14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI
- 15) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS
- NOT BOTTOMED OUT AFTER TORQUING.

  17) INSTALL D3660-1 CUFF AFTER CHEMICAL CONVERSION COAT BUT BEFORE PAINT, WITH A LAYER OF SIKAFLEX-241/-291 OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT BETWEEN CUFF AND CROSSTUBE. SEAL EDGE OF CUFF TO ENSURE NO GAPS.
- 18) TOUCH-UP HOLES WITH CHEMICAL CONVERSION COAT.

SHOP COPY RETURN TO **ENGINEERING UNCONTROLLED COPY** SUBJECT TO AMENDMENT WITHOUT NOTICE
WORK ORDER
NO. 62040 MCJ
12/08/27

@DEO ATTACHED

В	REVISI	RF	09.09.30					
Α	NEW IS	SSUE		CP	07.07.07			
REV.			DESCRIPTION	BY	DATE			
DESIGN		q)	DART AEROSP	ACE	LTD			
DRAWN		RF	HAWKESBURY, ONTARIO, CANADA					
CHECK	ĒD.	P	DRAWING NO.		REV. B			
MFG. AF	PR.	1/2	D412-664-249		SHEET 1 OF 4			
APPROVED 10			TITLE		SCALE			
DE APP	R.		CROSSTUBE (412 LOW AFT	Γ)	NTS			
DATE	09.0	9.30	COPYRIGHT © 2007 BY DART AI THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLED NOT TO BE USED FOR ANY PRIPOSE OF COMED OR COMMANCE MORTEN MEMORIES MEMORISHING POWN AND THE	ON THE EXP	RESS CONDITION THAT IT IS OTHER PERSON WITHOUT			

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NCR: Yes / No WORK ORDER NON-CONFORMANCE / UPDATE												
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Outside Dimensions

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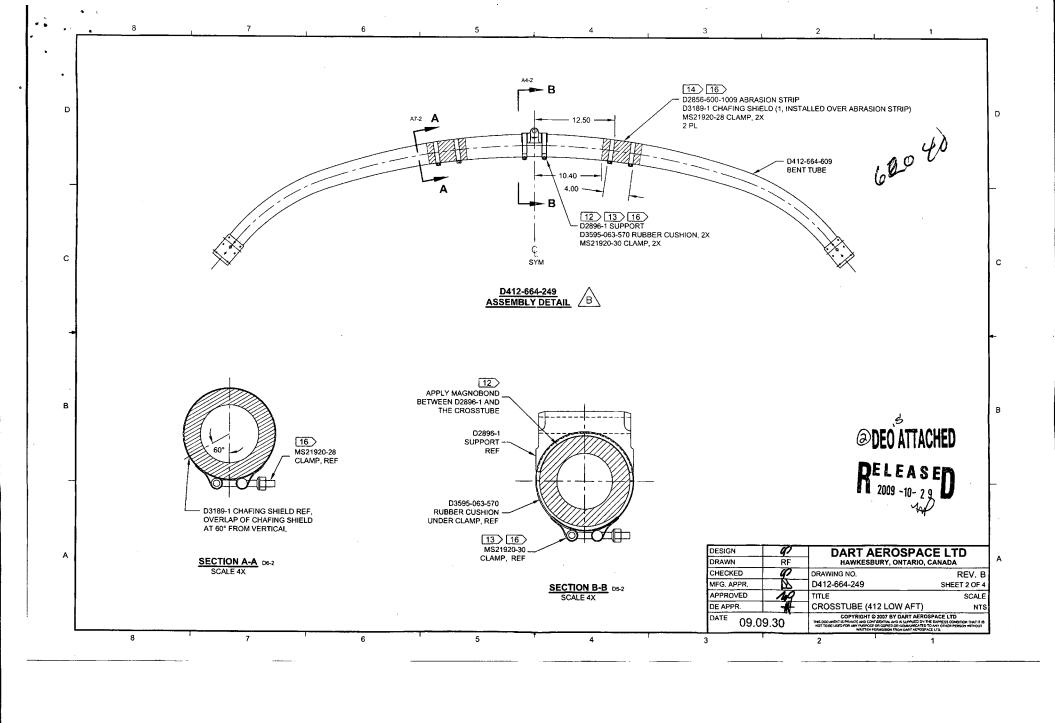
Date:

Turning Sequence

Wave/Twist in Tube

Finish

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					•					DC	A:	Date:	
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Misread

Out of Calibration

Out of Sequence

Outside Dimensions

Offset

Other

Power Loss/Surge

Turning Sequence

Wave/Twist in Tube

Ripples in Bend

Inspection Strip in Tube

Torque Waves in Extrusion

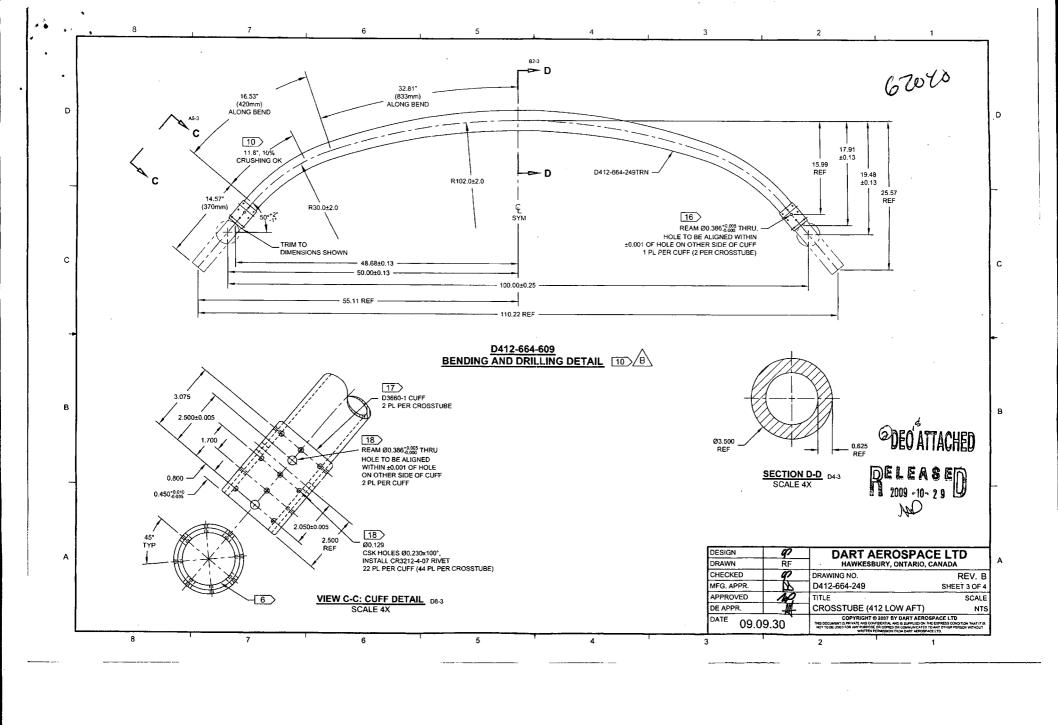
Cut Too Short

Drill Holes

Drawing

Finish

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G



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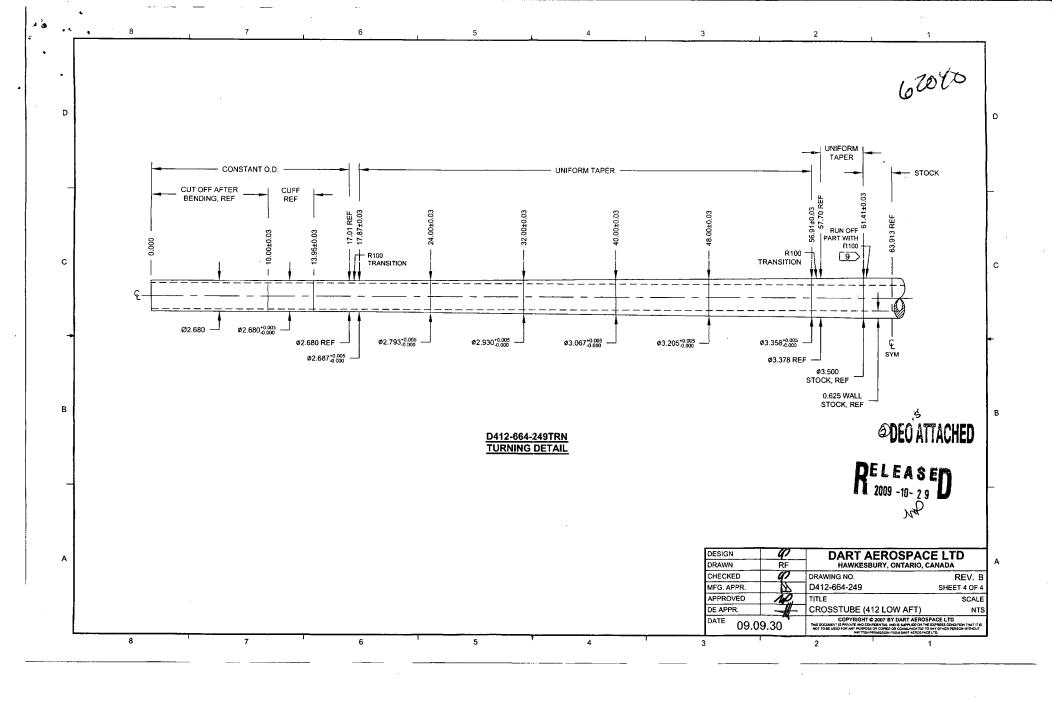
Outside Dimensions

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Turning Sequence

Wave/Twist in Tube

Finish



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Outside Dimensions

DQA:

Date:

Wave/Twist in Tube

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

DRAWING		TITLE	REV. B	DART AEROSPACE LTD	D.E.O. NO.	SHEET NO.	SCALE
. D412-66	64-249	CROSSTUBE ASS'Y (4	12 LOW AFT)	ENGINEERING ORDER	D412-664-249-B-1	SHEET 1 OF 2	NTS
DRAWN	P	CHECKED	Sc	MFG. APPR. Z	APPROVED M	DE APPR.	
DATE	11.05.2	5 DATE	11.05.31	DATE ((.05.3)	DATE 11/05/31	DATE 11.05.3	£ .

**PURPOSE:** 

REMOVED ABRASION STRIP IN FAVOR OF A THIN LAYER OF PROSEAL 890.

CHANGE:

PARTS LIST IS AMENDED AS FOLLOWS:

<u> 15:</u>

ltem	Qty -249	Part Number	Description	
3	0	D2856-600-1009	ABRASION STRIP	

# WAS:

3	2	D2856-600-1009	ABRASION STRIP	\
				<del></del>

NOTE 14, SHEET 1 IS AMENDED AS FOLLOWS:

<u>IS:</u>

14) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF\D3189-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEALED D3189-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.

#### WAS:

14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.

62048

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WITHOUT PERMISSION FROM DART AEROSPACE LTD.

										DQA:	Date:	•
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Root				Descri	ption of work order update		nitial	Ac	tion	Sign &		
Cause	Da	e Step	Qty	,	or Non-conformance	Ch	ief Eng	Desc	ription	Date	Verification	QC Inspector
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Out of Sequence

Outside Dimensions

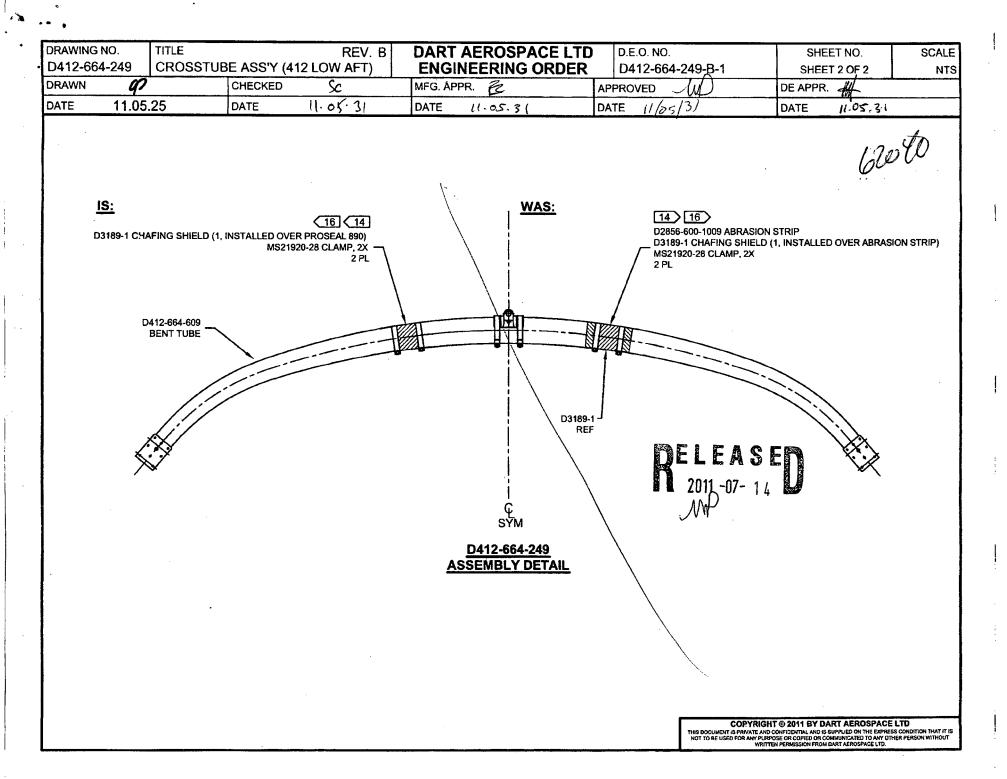
Turning Sequence

Wave/Twist in Tube

Finish

Folio

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NCR: Y	⁄es	/ No				WORK ORDER NON-	COI	NFORM	/IANCE / UPI	DATE		•		•	<i>1.</i> •
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Out of Sequence

Outside Dimensions

DQA:

Date:

Turning Sequence

Wave/Twist in Tube

Finish Folio

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

DRAWING I	NO. TITLE		REV. B	DART AEROSPACE LTD	D.E.O. NO.	SHEET NO.	SCALE
D412-664	1-249 CROS	STUBE ASS'Y (4	12 LOW AFT)	<b>ENGINEERING ORDER</b>	D412-664-249-B-2	SHEET 1 OF, 1	NTS
DRAWN	P	CHECKED	A)S	MFG. APPR.	APPROVED A	DE APPR.	
DATE	11.09.07	DATE	11.09.19	DATE /(.09.(9	DATE 11.09.19	DATE 11.09.19	

**PURPOSE:** 

REPLACE MAGNOBOND WITH 3M DP460 SCOTCH-WELD EPOXY ADHESIVE

60040

# **CHANGE:**

IS:

item	Qty -249	Part Number	Description
11	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD

#### WAS:

11	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023	
] .			ADHESIVE (TEXTRON/BELL SPEC. 299-947-100,	
			TYPE II, CLASS 2 ADHESIVE)	

NOTE 12 & 16, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) INSTALL D2896-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015. LET CURE FOR 24 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVE HAS CURED FOR 24 HOURS.

# WAS:

- 12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CUREFOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.



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Landi	ng G	iear				General	`.	*					•
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	$\boldsymbol{\vdash}$	Centre No	ot Conce	ntric to (	o/s	BOM/Route		Hardwa	re		Over/Under	tolerance	Temperature/Cure
	Н	Cracks				Broken/Damaged		Inspecti	on Incomplete		Part Incorre	ct	Weld
	П	Crushed/	Crimped.			Burrs		Instruct	ions Incomplete/Unclear		Part Lost/M	issing	Wrong Stock Pulled
		Cuffs				Contamination		Mainte	nance		Part Moved	-	
	П	Heat Trea	it			Countersink		Mislabe	led		Positioned V	<b>V</b> rong	_
		Inspection	n Strip in	Tube		Cut Too Short		Misread	I		Power Loss/	'Surge	Other
		Ripples in	Bend			Drill Holes		Offset					

Out of Calibration

Out of Sequence

Outside Dimensions

Turning Sequence

Wave/Twist in Tube

Torque Waves in Extrusion

Drawing

Finish

Folio

H:/FORMS/Quality Assurance\approved QA/NCRWO Rev G

DRAWING NO.	TITLE		R	EV. B	<b>DART AE</b>	ROSPACE LTD	D.E.O. NO	· ·	SH	EET NO.	SCALE
D412-664-249	CROSSTU	3E (412 LO	W AFT)		ENGINE	<b>ERING ORDER</b>	D412-66	64-249-B-3	SHE	ET 1 OF 3	итѕ
DRAWN	P	CHECKED	4		MFG. APPR.	$\overline{\mathcal{R}}$	APPROVED	M	DE APPE	₹#	
DATE 12.0	8.21	DATE	12.08.30		DATE	12.08.30	DATE	12.08.30	DATE	12.08.3	0

# **PURPOSE:**

REMOVED ABRASION STRIP IN FAVOR OF A THIN LAYER OF PROSEAL 890. UPDATE INSTALLATION OF CHAFING SHIELDS AND REDUCE TORQUE TO 40-50 IN-LBS. THIS ENGINEERING ORDER SUPERCEDES DEO D412-664-249-B-1

### CHANGE:

# PARTS LIST IS AMENDED AS FOLLOWS:

#### IS:

Item	Qty -249	Part Number	Description
_3_	0	D2856-600-1009	ABRASION STRIP



#### WAS:

3	2	D2856-600-1009	ABRASION STRIP

#### NOTE 14 AND 16 ON SHEET 1 IS AMENDED AS FOLLOWS:

# IS:

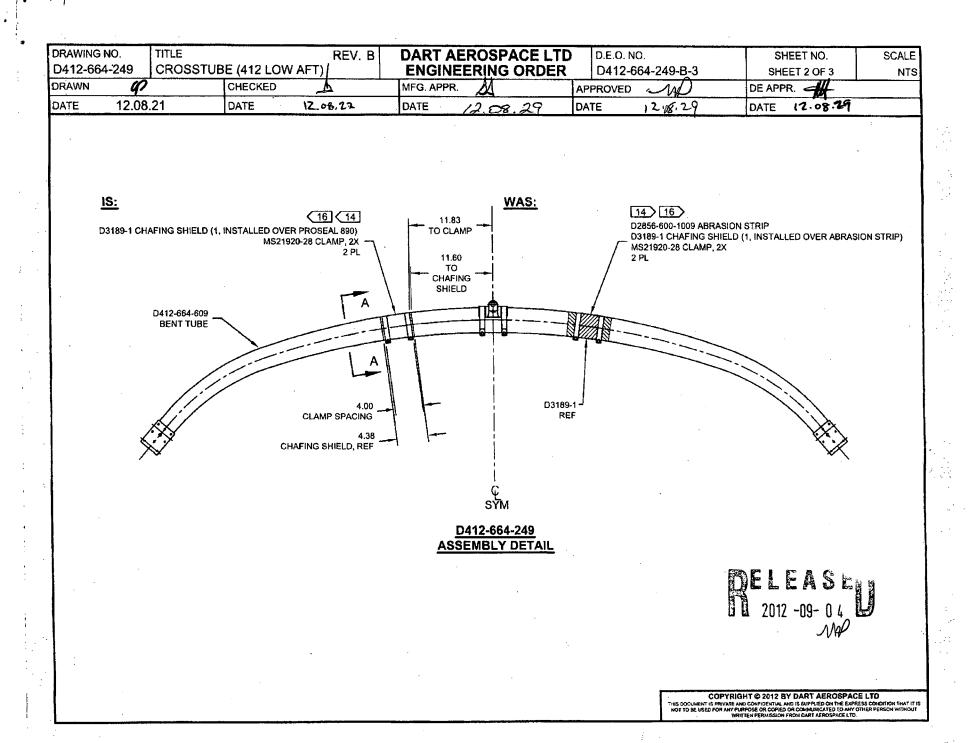
- 14) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3189-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEALED D3189-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS: [50]
- 16) TORQUE CLAMPS ON D2896-1 SUPPORT 80 TO 100 IN-LB. TORQUE CLAMPS ON D3189-1 CHAFING SHIELD 40 TO 50 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

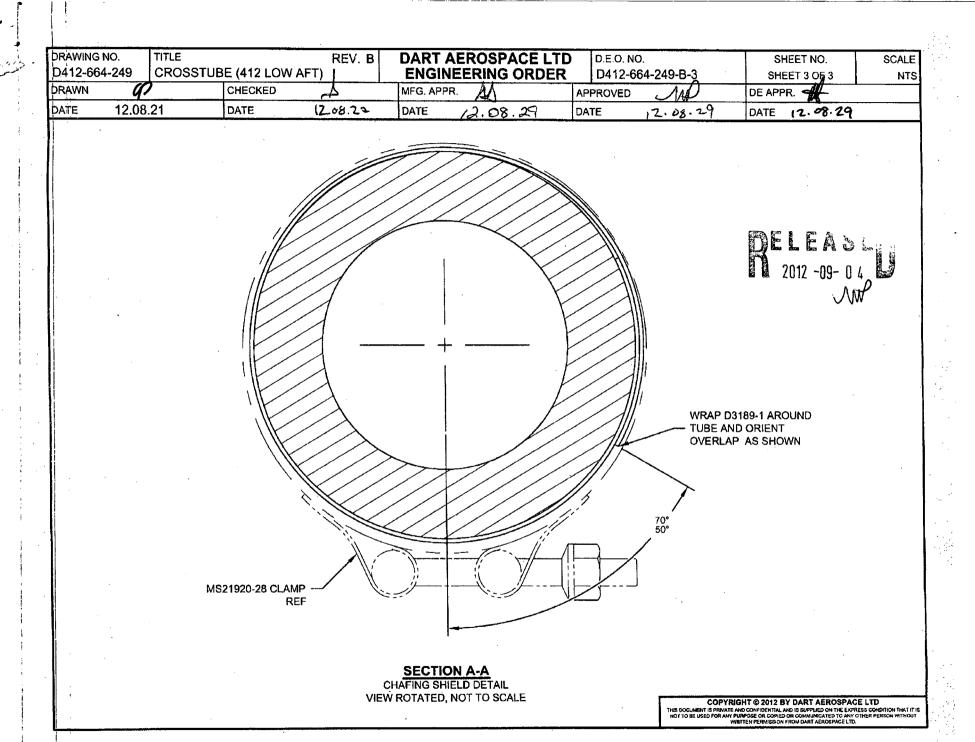
# WAS:

- 14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

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# REFERENCE ONLY 5 m/S

# DART AEROSPACE LTD.

IIN-D212-664

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# 5.2 STANDARD GEAR CROSSTUBES

Item	Item -107		-209	Part Number	Description			
	x			D212-664-107	CROSSTUBE INSTALLATION, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD FWD			
		х		D212-664-207	CROSSTUBE INSTALLATION, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD AFT			
			х	D412-664-209	CROSSTUBE INSTALLATION, 412 STANDARD AFT			
6	1			D212-664-147	CROSSTUBE ASSEMBLY, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD FWD			
7		1		D212-664-247	CROSSTUBE ASSEMBLY, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD AFT			
8			1	D412-664-249	CROSSTUBE ASSEMBLY, 412 STANDARD AFT			
40				* D2893-1	SUPPORT			
10 11	<u>2</u> 4			* D3595-063-450	RUBBER CUSHION			
12	4		<del></del>	* MS21920-25	CLAMP (OR MS21042-26)			
13	4			AN6-35A	BOLT			
14	4		<del> </del>	AN6-36A	BOLT			
15	6			MS21042L6	NUT (OR MS21042-6)			
16	18			AN960JD616	WASHER			
				+ 00040 4	SUPPORT			
20		2		* D2940-1	RUBBER CUSHION			
21		4		* D3595-063-530	CLAMP (OR MS21042-30)			
22		4		* MS21920-28	BOLT			
23		4		AN6-40A	BOLT			
24		2	ļ	AN6-41A	NUT (OR MS21042-6)			
25		6		MS21042L6 AN960JD616	WASHER			
26		18		ANSOUJDOTO	WASHER			
30			1	* D2896-1	SUPPORT			
32			2	* D3595-063-570	RUBBER CUSHION			
33			4	* MS21920-28	CLAMP			
34			2	* MS21920-30	CLAMP (OR MS21042-32)			
35		·	<b>-</b> 4==	-AN6-40A	BOLT——			
36			===	-AN6-41A	= BOLT			
37		<u> </u>	<b>6</b>	-MS21042L6	=:NUT:(@R-MS21042:6)\			
38			418-	-AN960JD616				
39			2	* D3189-1	CHAFING SHIELD			
				* D3659-1	CUFF			
45	2			* D3660-1	CUFF			
46	4.4	2	2	* CR3212-4-06	RIVET (M7885/3-4-06)			
47	44	44	44	* CR3212-4-00 * CR3212-4-07	RIVET (M7885/3-4-00)			
48			44	UNUZ 12-4-01				
50	1	1		D3428-1	PLACARD			

<sup>\*</sup>REFERENCE ONLY. PARTS ARE INCLUDED IN D212-664-147/-247 OR D412-664-249 ASSEMBLIES ABOVE NOTE: KITS INCLUDE EXTRA HARDWARE FOR COMPATIBILITY WITH BOTH DART AND BELL/AAI SKIDTUBES.

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Revision: **G** 

Date: 11.08.30

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PROJECT	<u> </u>	<del></del>		<u></u>	7)		
ITEM(S) EXAMINED					ر 		
JOB DESCRIPTION		PROCEDURE NO. LT	REV./DATE	2008	TECHNIQUE NO. LT		<u>008</u>
	SFE	CESW-TS		MATERIAL A	Hurinum	THICKNESS VALO	لان
PART NO.	siE	1-0000					
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TEST DETAILS METHOD	ZÍ FILIO	ORESCENT	VISIBLE	WATER WA	ASH SOLVENT F		EMULSIFIED NT < 2 fc
METHOD FAMILY BRAND	NAGNAF	FLUY		BLACK LIGHT S	S/N /6459 🗆 OUTPUT >	LIGHT OUTPUT>100 fc	@ SURFACE
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PENETRANT REMOV	SKD 52	MINIMUM DRY TIME MINIMUM DWELL TIME				CAL DUE DATE N	
DEVELOPER  DEVELOPER TYPE	Non Aci	QUEOUS AQUEOUS	☐ DRY				700.
TEST SURFACE					CI CHOT DI LOTTE	Z CLEAN BARE	METAL
SURFACE CONDITIO	ON AS GROU		NELDED C/ 20°F TO 10°C/5	MACHINED 50°F	☐ SHOT BLASTED  10°C/50°F TO 52°C		
SURFACE TEMPERA	ATURE - <-4°C/		UI ZUTP 10 10°C/E				
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